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DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S MANUAL

FEEDER, FINES, BITUMINOUS MIX
(BARBER-GREENE MDL 811A)
FSN 3895-025-9932
COMPONENT OF MIXING PLANT
ASPHALT, 100-150 TON PER HOUR
MDL KA-60; FSN 3895-936-8613

This reprint includes all changes in effect at the time of publication - Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
MAY 1968

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SAFETY PRECAUTIONS

BEFORE OPERATION

Before starting equipment be sure all controls and levers are in neutral position.

Replace all guards immediately after lubrication and adjustment.

Be sure that wheels on equipment are blocked when on a grade, no matter how slight.

Be sure that jack legs have been properly adjusted.

DURING OPERATION

Do not attempt to clean, oil, adjust, repair, or replace any parts while equipment is operating.

Always correct or report deficiencies that may result in further damage to the equipment if operation is continued.

Do not stand near or place tools or rags near moving operating mechanisms.

AFTER OPERATION

Stop operation when lubrication or adjustment is being accomplished.

Be sure that wheels on equipment are blocked when on a grade, no matter how slight.

Be sure that the jack legs have been properly adjusted.

Before moving feeder be sure all aggregate has been removed from the bins.

Change In Force: C1

TM 5-3895-289-10
C1

Change No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. *26 June 1973*

Operator's Manual
FEEDER, FINES, BITUMINOUS MIX, (BARBER-GREENE MDL 811A) FSN 3895-025-9932, COMPONENT OF MIXING PLANT ASPHALT, 100-150 TON PER HOUR, MDL KA-60; FSN 3895-936-8613

TM 5-3895-289-10, 3 May 1968, is changed as follows:

Page A-1. APPENDIX A is rescinded.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25B (qty rqr block No. 409) Operator's Maintenance requirements for Feeders Aggregate.

TM 5-3895-289-10

TECHNICAL MANUAL
NO. 5-3895-289-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C. 3 MAY 1968

OPERATOR'S MANUAL

FEEDER, FINES, BITUMINOUS MIX, (BARBER-GREENE MDL 811A) FSN 3895-025-9932, COMPONENT OF MIXING PLANT, ASPHALT, 100-150 TON PER HOUR, MDL KA-60; FSN 3895-936-8613.

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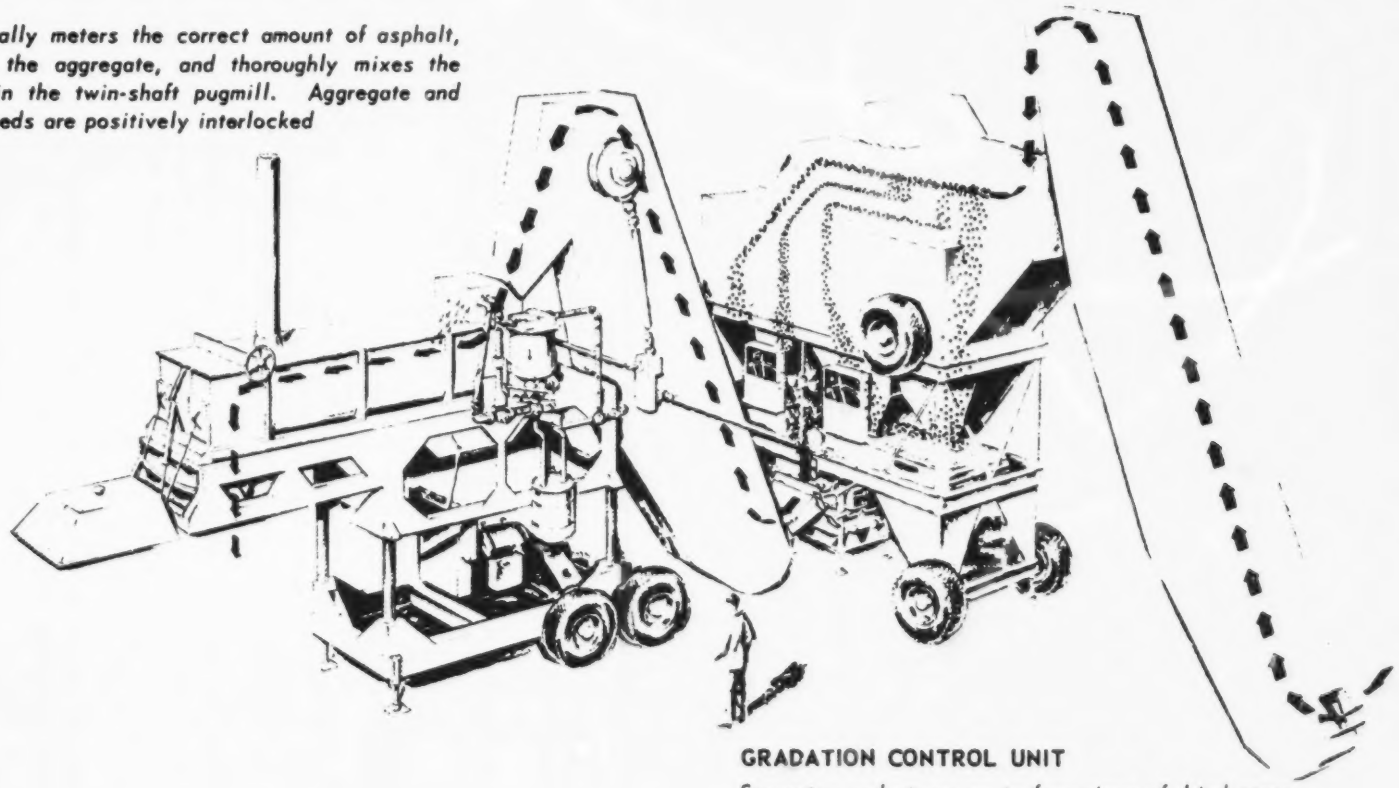
CONTINUOUS PLANT FLOW CHART

Only in the continuous plant is it possible to mechanically interlock the measurement of all separations of aggregate and the measurement of asphalt. A drive shaft from the pugmill gearbox drives the aggregate feeders and also drives the asphalt metering pump through a positive chain and sprocket. This mechanical interlock between the aggregate feeders and the asphalt pump assures the unsurpassed accuracy of the continuous plant.

MIXER

Automatically meters the correct amount of asphalt, pre-coats the aggregate, and thoroughly mixes the material in the twin-shaft pugmill. Aggregate and asphalt feeds are positively interlocked



GRADATION CONTROL UNIT

Separates and stores up to four sizes of dried aggregate. Automatically measures and feeds the required percentage of each size. Individual aggregate samples easily taken without interrupting plant production.

PLEASE READ THIS GENERAL EXPLANATION FIRST

On Page 3 we show a schematic diagram of the continuous plant. (The drying and screening principles are the same in both batch and continuous plants; consequently, the diagram, and this explanation, start with the dried, screened aggregate in each bin.) First, notice Figure 1.

Each bin has an apron feeder and adjustable, graduated gate. For simplicity, we show a single shaft, equipped with a revolution counter, turning all feeders. The same shaft drives the bitumen metering pump.

The correct weight of each size of aggregate is continuously fed out, and the combined aggregate is continuously sprayed with the correct weight of bitumen. Each revolution of the reference shaft may be regarded as a batch.

In this illustration, the plant is turning out a total mix of 250 pounds per revolution of the reference shaft. Since, in this case, the shaft is rotating at 33.33 revolutions per minute, the plant is producing 250 tons of total mix per hour.

Setting up the continuous plant involves two steps.

1. Calibrating the aggregate feeder gates. The gates are calibrated by running tests of various gate openings.

   During the tests the flow of aggregate is diverted into test buckets (Manual plants) or a weigh hopper (auto. sample plants) (see Fig. 2). On manual plants the weight of the contents of each bucket is divided by the number of revolutions run during the test, recorded by the revolution counter. This gives the number of pounds of aggregate feed per revolution from each gate, at each opening tested. The results are plotted on a spring graph. On plants with automatic sampling the number of revolutions per sample is pre-set by the operator and is counted automatically.

   The gate opening required to deliver the desired weight of aggregate from each bin per revolution is read from the Spring Graph.

   (If the specific gravity and operating temperature of the bitumen are known, the weight of bitumen to be delivered per revolution can be determined arithmetically as shown on Page 13.

2. Setting the Plant

   This consists of selecting the proper pump setting to have the bitumen metering pump deliver the correct amount of bitumen, determing the amount of aggregate required from each bin, and setting the feeder gates at the proper openings, according to the calibration spring.

   Normally, no other adjustments are required. However, in cases where higher capacities are desired or a large proportion of aggregate is to be fed from one bin, it is necessary to speed up the entire process. This is done by installing a different sprocket on the gradation unit apron feeder head shaft (See Page 6).

   Detailed instructions for the mix set up procedure, together with work sheet forms, are given in this manual, beginning on Page 4.

SCHEMATIC DIAGRAM OF THE CONTINUOUS BITUMINOUS PLANT

(The drying and screening principles are the same in both batch and continuous plants; consequently, this diagram starts with the dried, screened aggregate in each bin. For Diagram Purposes, liberties have been taken with the actual mechanical drives to illustrate inter lock of Bitumen and aggregate.

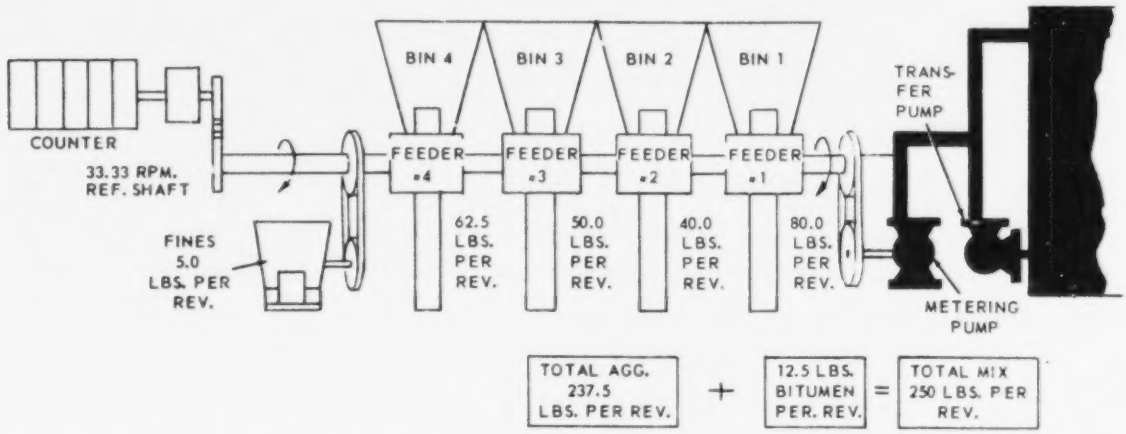


Figure 1 – OPERATION

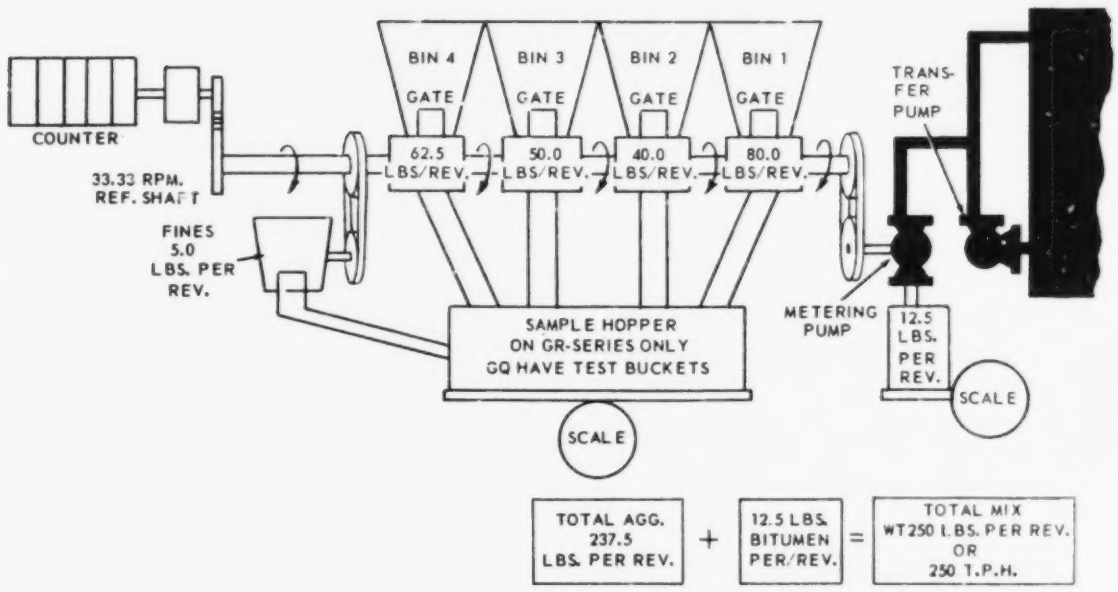


Figure 2 – CALIBRATION

MIX SET UP PROCEDURE

he first step in starting any bituminous plant, continuous or batch, is to determine the
lend and select the correct screens. Follow the simplified procedure beginning on Page 5 o.

The steps listed below assume that the gradation unit bins are already filled with the correct aggregates.

STEPS IN CALIBRATION PROCEDURE

Page

1. **Selecting Capacity Range**
   - A. Determine desired capacity range ---------- 5
   - B. Selection of Gradation unit feeder speeds ---------- 5-7
2. **Calibration of Gradation Unit feeder gates**

   Manual Method (GQ SERIES) ---------- 10-11
3. **Selection of Gradation Unit feeder gate openings** ---------- 12
4. **Selection of Pump Settings**
   - A. Arithmetic Method ---------- 13
   - B. Pump output method ---------- 13
5. **Setting Pump and Checking Output**
   - A. Setting Pump ---------- 14
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     1. Manual Weight Method ---------- 16
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1. Selecting Capacity Range

A. Determining desired plant capacity

The plant output should be governed by the ability of the laydown crew to handle the anticipated tonnage, the number of trucks available and distance of haul, and many other factors, so that the plant will run continuously without undue shut-downs.

After a capacity has been selected, check DRYER CAPACITY CHART (Table A) to be sure that this capacity is possible with the percentage of moisture to be removed.

TABLE "A"

DRYER CHART

Capacity in Tons Per Hour (Approx.)

DRYER MODEL NO.	% of Moisture																			
	4%			5%			6%			7%			8%			9%			10%	
	RANGE																			
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
DA60	166	185	200	142	157	170	124	138	149	110	122	132	99	110	118	90	100	114	82	91	99

B. Selection of Gradation Unit Feeder Speeds

1. An examination of the job specifications or an inquiry of the materials engineer will give the percentages of each aggregate needed. Determine the tons per hour required from each bin.

Example – Tons per hour to be mixed = Tons per hour from each bin
X % to be fed from each bin

250 TPH Desired

Bin #1	– 250 x 32%	= 80	TPH
Bin #2	– 250 x 16%	= 40	TPH
Bin #3	– 250 x 20%	= 50	TPH
Bin #4	– 250 x 25%	62.5	TPH
Fines	– 250 x 2%	= 5	TPH
Bitumen	– 250 x 5%	= 12.5	TPH
	100%	= 250	TPH

2. Refer to the Apron Feeder Capacity char Table C. Page 7. for Gradation Unit Model No. and select the feeder speeds that will satisfy the tonnage needed.

3. A 29 tooth sprocket on the **#1 feeder** and a 43 tooth sprocket on the #2 feeder will be installed at time of shipment. These should cover the normal capacity ranges desired.

   There are 5 sprockets available, (2) 29 tooth, high speed sprockets, (2) 43 tooth intermediate speed sprockets, and (1) 58 tooth slow speed sprocket. Only those combinations shown on Page 7, Table "C" may be used, due to feeder head shaft spacing. These sprockets may be installed as shown in Figure #3.

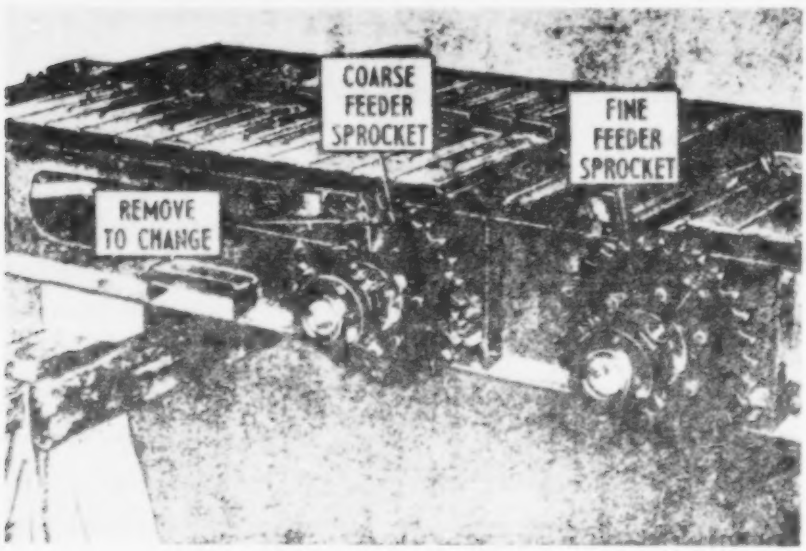

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Figure 3 – Feeder Drive Sprockets

TABLE "C"

APRON FEEDER CAPACITY CHARTS*
FOR
GQ 60 GRADATION UNITS

APRON FEEDER SPEED SELECTION SPKT. COMBINATIONS	GRAD. UNIT MODEL NO.	FEEDER NO. 1				FEEDER NO. 2			
		GATE 1		GATE 2		GATE 3		GATE 4	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
1) 29T on Fdr. No. 1									
43T on Fdr. No. 2	GQ 60	9.5	126.2	9.4	93.9	8.9	59.7	16.5	62.6
2) 43T on Fdr. No. 1									
29T on Fdr. No. 2	GQ 60	6.4	85.1	6.3	63.3	13.3	88.6	24.5	92.8
SPKT. COMBINATIONS LISTED BELOW OPTIONAL – EXTRA 29T, 43T & A 58T SET AVAILABLE									
3) 29T Spkts. on Both Shafts	GQ 60	9.5	126.2	9.4	93.9	13.3	88.6	24.5	92.8
4) 43T Spkts. on Both Shafts	GQ 60	6.4	85.1	6.3	63.3	8.9	59.7	16.5	68.6
5) 29T on Fdr. No. 1									
58T on Fdr. No. 2	GQ 60	9.5	126.2	9.4	93.9	6.6	44.3	12.3	46.4
6) 43T on Fdr. No. 1									
58T on Fdr. No. 2	GQ 60	6.4	85.1	6.3	63.3	6.6	44.3	12.3	46.4

NOTE – Only these 6 combinations can be used together because of feeder head shaft spacing. The 58T cannot be placed on No. 1 Feeder.

* These capacity figures should be considered as a guide only. Figure based on 95% Eff #1, 85% Eff #2, 80% Eff #3, 70% Eff #4, 100 lb. material.

These capacity figures are either pounds per rev. or tons per hour.

2. Calibration of Gradation Unit Feeder Gates

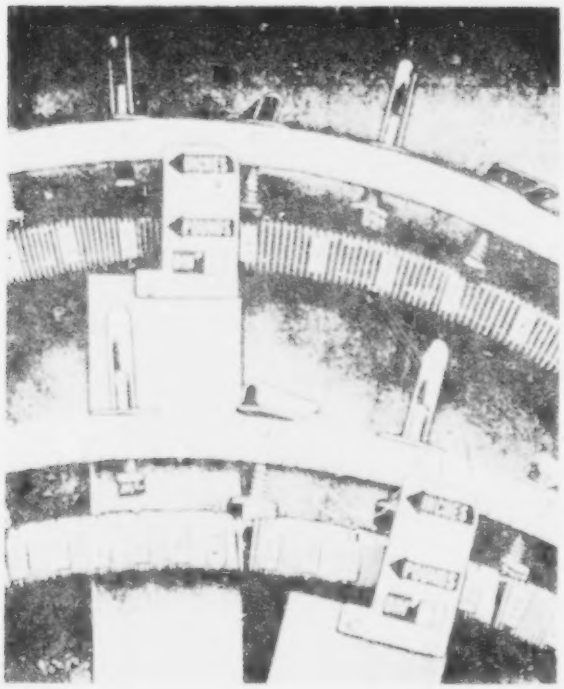

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Figure 4 – Spring Scale Setting

Figure 5. Deleted as not applicable.

Page 9. Deleted as not applicable.

Figure 6. Deleted as not applicable.

GQ - Series (Manual)

1. Weigh test buckets and mark weight on each bucket, and number buckets; place on dolly in position under test spouts.
2. Set all four apron feeder gates at 6" opening and run feeders with test gate lever in "Run" position, for two or three revolutions. This will enable material to flow thru the gate long enough to give the effect of the 6" gate to the end of the apron feeders without having aggregate drop into the test buckets.
3. Stop apron feeders and turn test gate lever to "Test" position.
4. Take revolution counter reading.

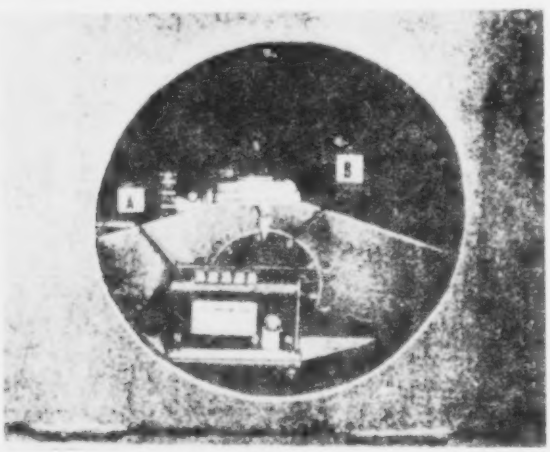

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Figure 7 – Revolution Counter

5. Run apron feeders long enough to fill test buckets. (Do not run over). Be careful not to stop and start apron feeders during test. Run continuously until desired amount of material is in the test buckets.

6. Stop apron feeders and again record counter reading. The number of revolutions in the operation is determined by subtracting the first counter reading from the last counter reading.

7. Weigh each test bucket carefully and subtract weight of bucket. The weight of each size material is divided by the number of revolutions run, giving the pounds per revolution flow for a 6" gate opening for each size of aggregate.

8. Repeat and take average of three trials for accuracy.

9. Lift all spring clamps away from indicator springs. Each coil represents one pound per revolution. Stretch each spring from 6 inch end until gate pointer is over coil corresponding to pounds per revolution obtained in tests. Spring should be stretched uniformly over entire 6 inch scale. Lock springs by releasing clamps at the six inch mark. (Refer to Figure 4).

10. Check setting by running another sample. ***NOTE*** – *If actual feeder delivery does not quite match reading on indicator spring, make final adjustment of spring at nearest spring lock before moving gate and without changing the ten inch setting of the spring.*

11. Repeat this procedure for several different gate settings. Three counter revolutions will be sufficient at each setting. Adjust spring, if necessary, as in item 10 above.

EXAMPLE – CALIBRATION TEST GQ–75 (MANUAL)

		(Weight of filled bucket)	MINUS	(Weight of empty bucket)	EQUALS	(Weight of aggregate delivered)	DIVIDED BY (Revolutions run-final counter reading less initial reading)	EQUALS (Pounds delivered per revolution)
TEST #1	Bin #1	267.25	—	(1) 33.5	=	(1) 233.75	Final 6541.00	(1) 212.5
6" GATE	Bin #2	191.9	—	(2) 33.5	=	(2) 158.4	Less Initial 6539.90	(2) 144.0
OPENING	Bin #3	154.5	—	(3) 33.5	=	(3) 121.0	÷ 1.10 =	(3) 110.0
	Bin #4	179.0	—	(4) 33.5	=	(4) 145.5		(4) 132.3
TEST #2	Bin #1	330.72	—	(1) 33.5	=	(1) 297.22	Final 6542.40	(1) 212.3
6" GATE	Bin #2	235.48	—	(2) 33.5	=	(2) 201.88	Less Initial 6541.00	(2) 144.2
OPENING	Bin #3	187.64	—	(3) 33.5	=	(3) 154.15	÷ 1.40 =	(3) 110.1
	Bin #4	219.14	—	(4) 33.5	=	(4) 185.64		(4) 132.6

Set pounds of aggregate delivered per revolution at the different gate openings on the Spring Scale Graph. (Also record on work sheet if permanent record is desired.)

NOTE – *With some types of aggregates, when calibrating the 8" & 10" gate opening at the maximum feeder speed, it may be necessary to run two tests and combine the weights to obtain a full revolution of of the aggregate feeders.*

3. Selecting Feeder Gate Openings

A. Determine pounds per revolution to be used from each bin.

Example:

300 Total TPH desired	X	.32%	#1 Bin	96 T.P.H.	x 1	= 96 lbs/per/rev.
	X	.16%	#2 Bin	48 T.P.H.	x 1	= 48 lbs/per/rev.
	X	20%	#3 Bin	60 T.P.H.	x 1	= 60 lbs/per/rev.
	X	.25%	#4 Bin	75 T.P.H.	x 1	= 75 lbs/per/rev.
See respective sections for fines & asphalt	X	.02%	Fines	6 T.P.H.	x 1	= 6 lbs/per/rev.
	X	.05%	Asphalt	15 T.P.H.	x 1	= 15 lbs/per/rev.

B. Adjust each gate until the gate pointer corresponds to the lbs. per (revolution on the spring graph) to be used from that bin. ***NOTE** – The feeder gate setting should always be approached from the lower side. This removes backlash from the linkage for greater accuracy.*

C. Checking Gate Settings

After the gradation unit gates have been set at the correct openings as determined on Page 10 (Manual) it is important to check the amount of aggregate actually being fed from each gate. This check is made by following the same procedure as used to calibrate each gate. If a gate is feeding too much or to little, it can be corrected by slightly increasing or decreasing the gate openings. If a gate is reset, another check should be made.

EXAMPLE RECHECK CHARTS

RECHECK – GQ75 (MANUAL)

Set Gates By Pounds Scale Spring Graph	(Weight of filled bucket)	MINUS	(Weight of empty bucket)	EQUALS	(Weight of aggregate delivered)	DIVIDED BY (Revolutions run-final counter reading less initial reading)	EQUALS (Pounds delivered per revolution)
Gate 2.5 IN. Bin #1	139.21	— (1)	33.5	= (1)	105.71	Final 6545.20	(1) 96.1
Gate 1.9 IN. Bin #2	86.3	— (2)	33.5	= (2)	52.8	Less Initial 6544.10	(2) 48.0
Gate 3.2 IN. Bin #3	99.06	— (3)	33.5	= (3)	65.56	1.10	(3) 59.6
Gate 3.4 IN. Bin #4	115.89	— (4)	33.5	= (4)	82.39		(4) 74.9

***NOTE** – Gates feeding coarse aggregate should NOT be set lower than 1-1/2 times the largest aggregate size. For example, it is feeding aggregate with 1" maximum lumps, the gate must not be set lower than 1-1/2".*

D. If a permanent record of the calibration of gate setting is wanted a simple chart may be made, as illustrated below, on the form provided in back of the book.

#1 Bin

Inches	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	Inches
Pounds	16	32	48	64	80	95	110	125	138	150	Pounds

4. Selection of Pump Setting

Selecting the pump settings maybe done by the Arithmetic Method if the specific gravity and pump temperature of the bitumen to be used is known.

If the specific gravity or pumping temperature are not known, the pump output method must be used to select pump setting.

A. Arithmetic Method (Specific Gravity & Temperature Known)

1. Determine pounds per revolution of bitumen to be used in mix by multiplying tons per hour of bitumen to be used by 1. Tons per hour of bitumen is found by multiplying total mix by percent of bitumen required in mix.

Example – 250 TPH X 5% A.C. X 1 = pounds of bitumen per revolution.

250 X .05 (Express % as decimal X 1 - 12.5 lbs/per/rev.

2. Calculate lbs/per/gal. of Bitumen being used.

1.015 (Specific gravity of bitumen) X 9360 (Temp. factor from Table D) = .950 X { 8.328 (for U. S. gals.) / 10.002 (for Imperial gals.) } = 7.91 Lbs. (Lbs. of bitumen per gal.)

(Delivery Ticket has S.G.) (Table "D")

3. If lbs per gallon equals 7.85 then pump setting may be read from pump chart E, Page 14 (Charts based on 7.85 lbs. per gallon). If lbs. per gallon other than 7.85, as in example above, correct dial setting is obtained as follows:

Example – 12.5 (Lbs./Rev. Req. in Mix) X 7.85 ÷ 7.91 (Calculated lbs./gal. from above) = 12.4 (Correct lbs./Rev. to be used on Chart E, Page 14)

B. Pump Output Method (Specific Gravity or Temperature not known)

1. Same as Step 1 of Arithmetic Method

2. The pump dial setting may be read from lbs/per/rev Chart E, Page 14, corresponding to your mixer model No. (This figure is based on bitumen weighing 7.85 lbs. per gal. which is a average used for chart purposes). Since Specific Gravity and Temperature change, the actual pump output may be checked to ensure accuracy. (See "checking Pump Output" Page 14.)

***NOTE** – Make at least one calibration check to insure accuracy.*

TABLE "D"

250 (Specified temp. of bitumen) °F

T=temperature at which bitumen will be pumped. F=temperature factor.

T	F	T	F	T	F	T	F	T	F
125	0.9775	175	0.9606	225	0.9441	275	0.9280	325	0.9123
130	0.9758	180	0.9590	230	0.9425	280	0.9264	330	0.9107
135	0.9741	185	0.9573	235	0.9409	285	0.9248	335	0.9092
140	0.9724	190	0.9556	240	0.9392	290	0.9233	340	0.9076
145	0.9707	195	0.9539	245	0.9376	295	0.9217	345	0.9061
150	0.9691	200	0.9523	250	0.9360	300	0.9201	350	0.9045
155	0.9674	205	0.9507	255	0.9344	305	0.9185	355	0.9030
160	0.9657	210	0.9490	260	0.9328	310	0.9169		
165	0.9640	215	0.9474	265	0.9312	315	0.9154		
170	0.9623	220	0.9458	270	0.9296	320	0.9138		

CHART "E" METERING PUMP CAPACITY CHART

Figure 8. Deleted as not applicalbe.

KA & KB 60

Pump Setting	10	20	30	40	50	60	70	80	90	100
Lbs. Per Rev.	1.67	3.34	5.0	6.67	8.34	9.22	11.8	13.2	15.3	16.7

Figure 9. Deleted as not applicable.

NOTE: Lock pump liner after adjustment with lock screw in face of pump.
Chart is based on asphalt at 7.85 lb. per gallon.

5. Setting Bitumen Pump & Checking Output

A. Setting Pump

The asphalt metering pump is adjustable by means of the dial shaft on the pump. Loosen the lock screw on the pump head and the set screw on the dial shaft. ***NOTE** – Setting the dial below the zero mark will reverse the flow of liquid through the pump.*

When setting the volume control, always approach the desired setting from a lower setting. (See arrow on dial) This is because of a backlash or clearance between parts.

***NOTE** – For most accurate settings, change setting while unit is not rotating. Always tighten lock screw after setting.*

Between the metering pump and the test bucket is a valve controlling the direction of the asphalt flow either to the Spray Bars when mixing or to the test barrel when sampling.

A second valve is used to divert A.C. to Spray Bars or return to storage for circulating.

B. Checking Pump Output

Figure 10 – Metering Pump

1. Manual sample (KA Series)

A. Move the test scale into position and mount one test bucket on the scale. Weigh and record the test bucket weight.

B. Put the sample pipe into the other bucket and run the mixer until asphalt starts to discharge. Stop the mixer and allow the pipe to drip one minute.

C. Place the sample pipe into the scale mounted test bucket and record the reading on the revolution counter.

D. Run the mixer until the asphalt level in the test bucket is near the top. Stop the mixer.

E. Allow the sample pipe to drip for one minute. Weigh the sample and subtract the weight of the sample bucket to obtain the weight of the asphalt.

F. Record the revolution counter reading and subtract the reading at the beginning of the test to obtain the number of revolutions used in the test.

G. Divide the weight of the asphalt by the number of revolutions to obtain the pounds per revolution. Adjust the metering pump if necessary and take another test to check results.

***NOTE** – Be sure to weigh the test bucket before each test as asphalt clinging to the sides of the test bucket will change its weight.*

EXAMPLE - SAMPLE FORM - MANUAL ASPHALT PUMP CALIBRATION KA-70

NOTE: If the same answer is obtained from the first two tests, the third test is not necessary.	FIRST TEST	SECOND TEST	THIRD TEST	FOURTH TEST
Dial Setting	20	40	60	80
Weight of filled test bucket	93.02	140.76	175.96	224.26
Less weight of empty bucket	− 33.5	− 34.2	− 35.2	− 36.1
Equals pounds of bitumen delivered	59.52	106.56	140.76	188.16
Revolution counter reading at end of test	1457	1468.1	1478.8	1488.6
Less initial revolution counter reading	−1444.6	−1457	−1468.1	−1478.8
Equals revolutions run	12.4	11.1	10.7	9.8
Pounds of bitumen delivered during test	59.52	106.56	140.76	188.16
Divided by revolutions run	÷ 12.4	÷ 11.1	÷ 10.7	÷ 9.8
Equals pounds of bitumen per revolution	4.80	9.60	13.20	19.20

Figure 11. Deleted as not applicable.

2. Manual (KA Series) Meter (optional)

1. After a short run to let asphalt circulate through meter stop mixer.
2. Read and record revolution counter.
3. Read and record meter counter.
4. Run mixer.

   ***NOTE** – Run mixer longer than 1 minute for greater accuracy.*

5. Stop mixer and read revolution counter.
6. Read meter counter.
7. Divide meter indication by revolutions run to find gallons per revolution.

Final revolution reading	_____
Initial revolution reading	_____
revolutions run	?
Final Meter reading	_____
Initial Meter reading	_____
Gallons run	X

$$\frac{X}{?} = \frac{\text{Gal.}}{\text{Rev.}}$$

To find pounds per revolution apply same procedure used in step 5 on KB mixers.

8. To adjust metering pump follow steps 6, 7 and 8 on KB mixers.

6. Calibration of Fines Feeders

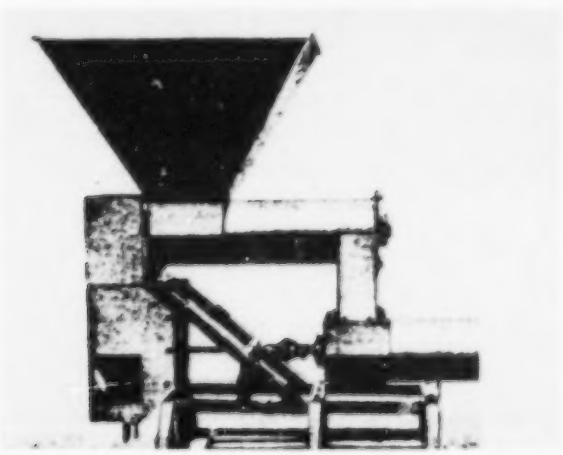
811 Fines Feeder

The principle used in calibrating the fines feeder is exactly the same as that used for calibrating the G.Q. gradation unit feeder gates. See Page 10 for explanation.

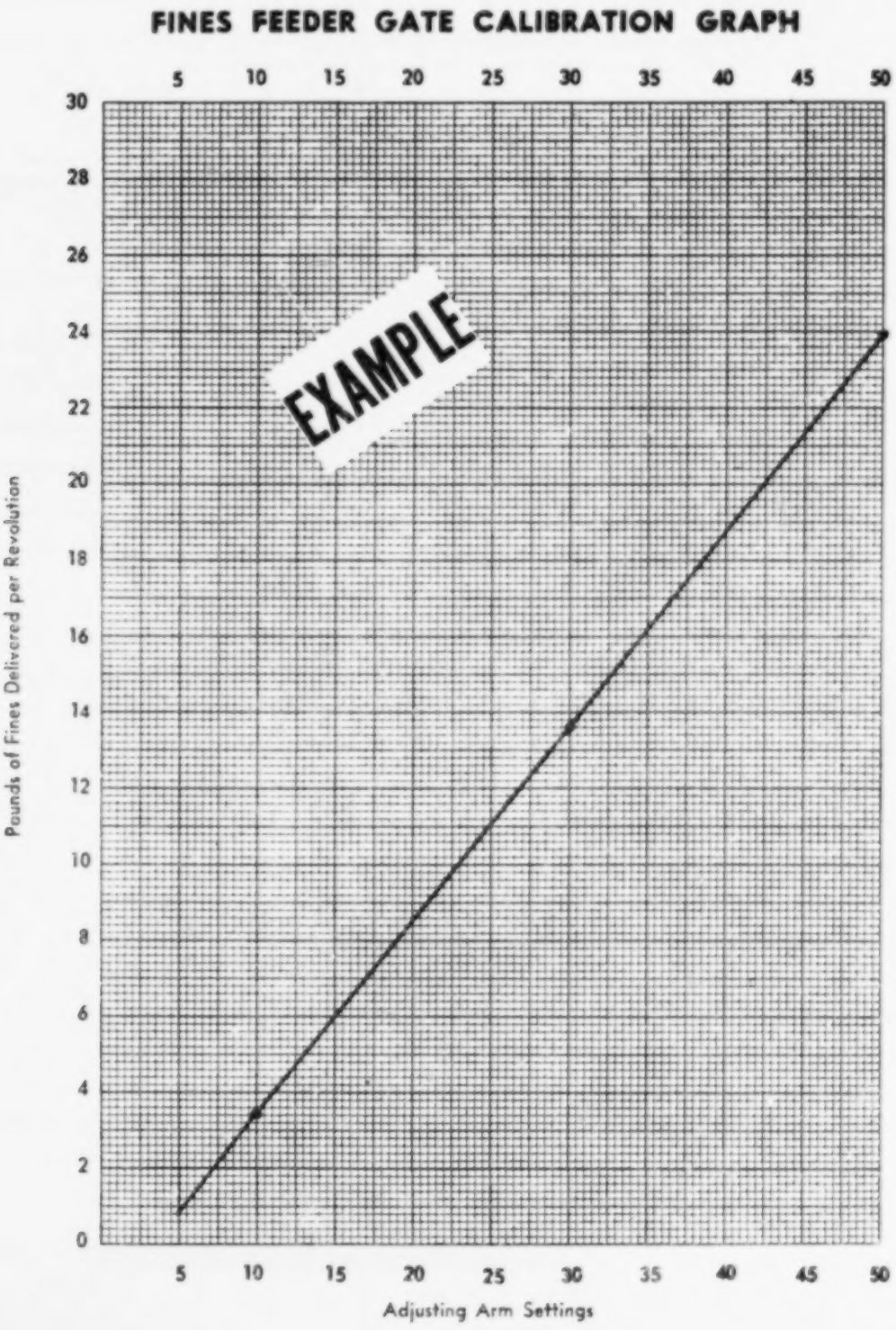
EXAMPLE -*(Below is a facsimile of Work Form with figures filled in for this example.)*

Be sure that gradation unit feeders are empty and that fines feeder hopper is filled with at least 300 pounds of fines. Hinged door (see photo below) is opened so that it lies back against housing. Short screw must be filled with material before calibration is begun.	ADJUSTING ARM SETTINGS (Use setting of 50 for first trial, then 30 and 10.)		
	50	30	10
Enter initial revolution counter reading and run feeder until test bucket is half full. Weigh the bucket and fines delivered during test and enter weight at right ...	96.82	49.00	97.06
Less weight of empty bucket ...	- 28.56	- 28.56	- 28.56
Equals weight of fines delivered ...	68 26	70 44	68.50
Revolution counter reading at end of trial ...	09.62	15.76	36.58
Less initial revolution counter reading ...	- 06.76	- 10.58	- 16.45
Equals revolutions run ...	2.86	5.18	20.13
Weight of fines delivered ...	68.26	70.44	68.50
Divided by revolutions run ...	÷ 2.86	÷ 5.18	÷ 20.13
Equals pounds delivered per revolution ...	23.9	13.6	3.4

Plot pounds of fines delivered per revolution at the different adjusting arm settings on Fines Feeder Gate Calibration Graph (next page) and connect points with a straight line.



EXAMPLE- *(Below is a facsimile of Work Form with line plotted from the example shown on Page 19)*



Page 21. Deleted as not applicable.

Figure 12. Deleted as not applicable.

Page 22. Deleted as not applicable.

Page 23. Deleted as not applicable.

Page 24. Deleted as not applicable.

Page 25. Deleted as not applicable.

7. Single Aggregate Calibration (KA 60 Mixer only.)

Method No. 1
For step by step procedure use either Method #1 or #2, below, depending on your preference.

If you have a 442 Ground Mounted Hopper as shown in Figure 13, weigh test buckets and record weight of buckets.

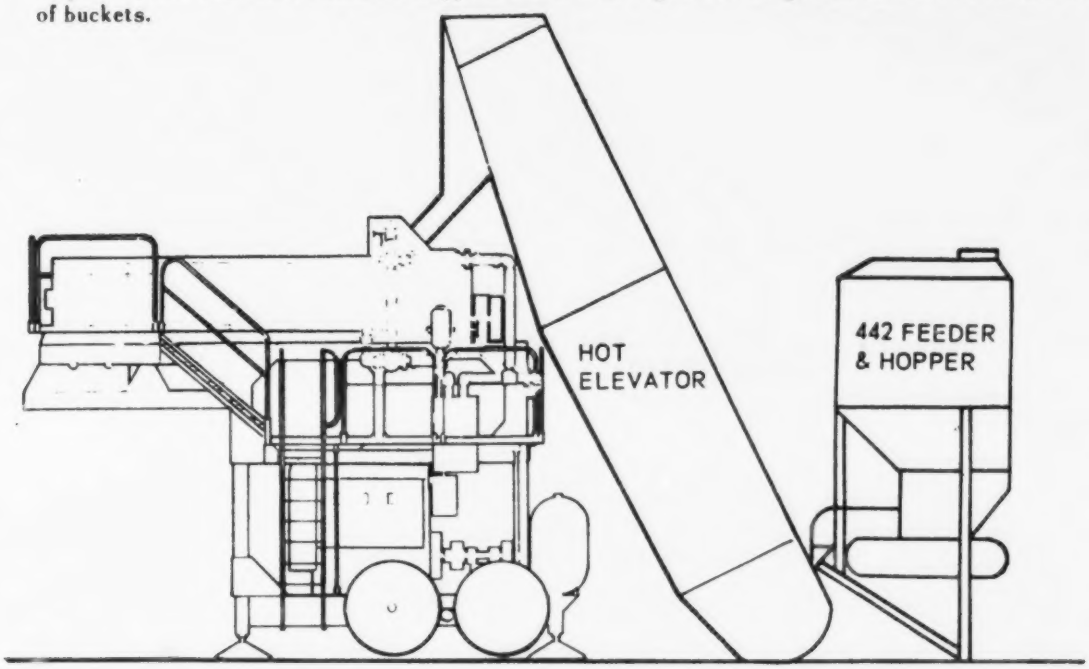


Figure 13 – Single Aggregate Ground Mounted Feeder and Hopper

1. Set the aggregate feeder gate at 2" opening.

   ***IMPORTANT** – When feeding coarse aggregates, the feeder gate should NOT be set lower than 1-1/2 times the largest aggregate size. For example, if the gate is feeding aggregate with 2" maximum lumps, the gate must not be set lower than 3".*

2. Run material into the 442 aggregate hopper and run material for 2 or 3 revolutions of the counter, located on mixer, into the hot elevator and out through pugmill. Do this with the flop gate lever to the operator's left.

3. Then stop the feeder and turn the flop gate lever to the operator's right.

4. Check and record the revolution counter reading to the nearest hundredth. (Refer to Page 27 for example.)

5. Put the test buckets under the spouts and run the feeder until the buckets are full. Be careful not to start and stop the feeder during the test, nor to run the test buckets over.

6. Stop feeder and again take the reading of the revolution counter. Determine the number of revolutions in the test by subtracting the reading taken in Step #4 from this one.

7. The test buckets are weighed. Subtract weight of buckets. The weight of the material in the buckets is divided by the number of revolutions run, giving the pounds per revolution flow for a 2" gate opening. (Refer to Page 27 for example.)

   ***NOTE** – Take average of a minimum 3 trials for accuracy.*

8. This procedure is then repeated for a 4", 6" and 8" gate opening. When changing gate openings,

say from 2" to 4", run the feeder at least 3 revolutions into the hot elevator before the next test to strike the material off to the new level.

9. The results of the tests on the various gate openings are plotted on a chart in pounds of aggregate per revolution of counter, against inch gate opening. A curve is drawn through the plotted points. See examples Pages 28

***NOTE** – Two test buckets are used with the ground mounted hopper and feeder. Weigh and record weights of buckets. Combine weight of buckets after material test has been made and subtract weight of buckets to give weight of material delivered as shown in example below.*

		(Weight of filled bucket)	MINUS (Weight of empty bucket)	EQUALS (Weight of aggregate delivered)	DIVIDED BY (Revolutions run-final counter reading less initial reading)	EQUALS (Pounds delivered per revolution)
TEST #1 2" GATE OPENING	FOR GROUND MOUNTED HOPPER AND FEEDER	394.60	- 29.20	= 365.40	÷ Final 1592.85 Less Initial 1587.05 = 5.80	= 63
TEST #2 4" GATE OPENING		358.80	- 29.20	= 329.60	÷ Final 1597.30 Less Initial 1594.10 = 3.20	= 103
TEST #3 6" GATE OPENING		352.60	- 29.20	= 323.40	÷ Final 1601.75 Less Initial 1599.55 = 2.20	= 147
TEST #4 8" GATE OPENING		331.60	- 29.20	= 302.40	÷ Final 1605.11 Less Initial 1603.51 = 1.60	= 189

Plot pounds of aggregate delivered per revolution at the different gate openings on Gradation Unit Feeder Gate Calibration Graph (next page), and connect points to form a curve for each gate.

Method No. 2

1. Run the material into aggregate hopper, through feeder and into pugmill. Run the pugmill with the dam gate in low position until approximately one half yard of material has run off the end of the pugmill and then stop the Mixer by throwing out the main clutch.

2. Now check and record the reading of the revolution counter to the closest hundredth. (Refer to Page 29 for example.)

3. Place a dump truck under the pugmill discharge and engage mixer main clutch, thus starting feeder and pugmill at the same time. Run approximately one yard of material into the truck box and again stop the Mixer.

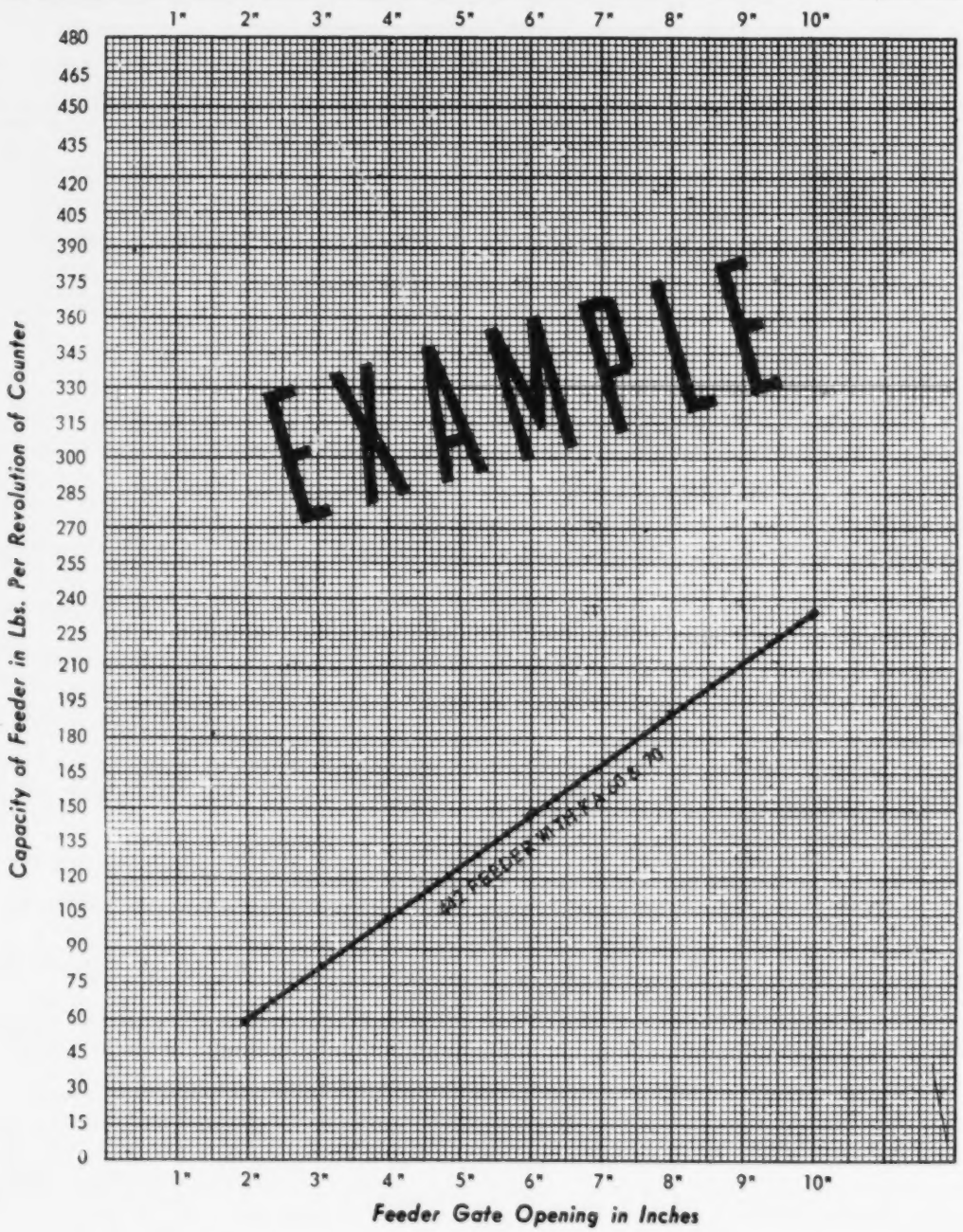
4. Check the revolution counter to the closest hundredth of a revolution and subtract first reading from the last reading. The answer will be the net revolutions run during the test.

FORM

FEEDER GATE CALIBRATION CHART
FOR SINGLE AGGREGATE PLANTS

Machine Model_____ Revolution Counter_____ RPM

Job_____



5. Weigh the truck load of material run and subtract the weight of the truck from the total weight giving weight of material run.

6. This weight of the material is then divided by the number of revolutions run, giving pounds per revolution flow for 2" gate opening. (Refer to Page 26 for example.)

7. Repeat this procedure of testing on other gate openings such as 4", 6", 7" and 10".

***IMPORTANT** – After each increase in gate opening, be sure to operate the Mixer until the increase in aggregate flow through the gate has moved through the pugmill and increased the rate of discharge from the pugmill before running test.*

8. Plot the results of these tests, using gate openings in inches against lbs. of Aggregate per Revolution on a graph, and draw a line intersecting the plotted points. This aggregate flow chart will enable the operator to select a proper gate opening, to deliver a desired quantity of aggregate, in pounds per revolution, See example below.

FOR MIXER MOUNTED HOPPER AND FEEDER

$$25{,}240 - 23{,}000 = 2240 \div \begin{matrix}\text{Final } 1628.40 \\ \text{Less Initial } 1592.85\end{matrix} \quad 35.55 = 63$$

(Weight of filled truck) MINUS (Weight of empty truck) EQUALS (Weight of aggregate delivered) DIVIDED BY (Revolutions run- final counter reading less initial reading) EQUALS (Pounds delivered per revolution)

To Set the Plant up to produce Mix:

1. Set the aggregate gate to correct opening to obtain desired tonnage out put.

2. Dial correct pump setting to obtain needed percentage of asphalt. See Chart, Page 13.

If pump must be calibrated, refer to manual pump calibration procedure, Page 17.

Example: KA60 Mixer 200 TPH – 5% A.C.

200 X .05 – 10.0 TPH AC
190.0 TPH Agg.

190 TPH – Approx. 8" gate opening on agg. feeder
10 TPH – Approx. #42 setting on pump dial.

8. Determining the Proper Aggregate Blend and Selecting the Correct Screens

The first step in starting any bituminous plant—continuous or batch—is to determine the proper aggregate blend and select the correct screens. This work is normally done by an engineer, but if it must be done by plant personnel, the following simplified procedure may be used.

1. Enter mix specifications in Columns A and B of Form below. Permissible percentages of each size are stated in the specifications either as minimum—maximum limits (10% to 30%) or as a definite percentage (13.6%).

2. If the percentages entered in Column B are based on total mix (that is, if the percentage of bitumen must be added to equal 100%), it is necessary to convert these percentages to 100% aggregate. This is done by dividing the percentages in Column B by the total percentage of aggregate (100% minus the percentage of bitumen). The corrected percentages are entered in Column C.

3. List the available aggregates in Columns D through H, and enter the gradation of each, based on actual test results.

4. Select the aggregates which appear most likely to produce the desired gradation by comparing their gradations with the specified gradation in Column B or C. Enter the names of these aggregates at the top of Columns I through L under "First Gradation Trial." Enter the gradations of these aggregates in Column (1) under each of the aggregates. (This information may be taken from Columns D through H.)

5. By comparing the gradations of the aggregates listed under "First Gradation Trial" with the specified percentages of each size, determine the percentage of each aggregate which appears likely to give the specified gradation. Enter these percentages at the top of Column (2) under each of the aggregates listed.

6. In Columns I through L, multiply the percentages listed in Column (1) under each material by the percentage at the top of Column (2). Enter the results in Column (2).

7. Add the percentages listed in Column (2) under each material horizontally and enter the totals in Column M.

8. Compare the percentages in Column M with the specified percentages in Column B or C. If the gradation in Column M is within the specification limits, the proper aggregate blend has been determined. Skip Steps 9, 10, 11, and 12, and go immediately to Step 13. Otherwise, continue with Step 9.

9. Compare the percentages in Column M with the

EXAMPLE- *(Below is a facsimile of Work Form with figures filled in for this example.)*

				← GRADATION OF AVAILABLE AGGREGATES →					← FIRST GRADATION					
A		B	C	D	E	F	G	H	I		J		K	
SCREEN SIZES		AGGREGATE SPECS.	SPECS CONVERTED TO 100% AGGREGATE	River Sand	Blow Sand	Fine Sand	Crushed Stone	Gravel	Crushed Stone		River Sand		Fine Sand	
PASS	RET.	%	%	%	%	%	%	%	(1) %	(2) 60%	(1) %	(2) 25%	(1) %	(2) 15%
1"	3/4"	5-20					28	4	28	16.8				
3/4"	1/2"	10-30					23	6	23	13.8				
1/2"	#4	15-35					37	15	37	22.2				
#4	#10	8-18		40	1		5	22	5	3.0	40	10.0		
#10	#40	10-20		51	52	31	1	33	1	.6	51	12.8	31	4.7
#40	#80	5-20		5	44	32	2	15	2	1.2	5	1.2	32	4.8
#80	#200	5-15		2	2	32	1	4	1	.6	2	.5	32	4.8
#200		4-6		2	1	5	3	1	3	1.8	2	5	5	.7
TOTALS			100%	100%	100%	100%	100%	100%	100%	60%	100%	25%	100%	15%

specified percentages in Column B or C, and determine what changes are required to produce an aggregate blend that will meet the specifications. These changes may include adding a different aggregate, substituting one aggregate for another, eliminating an aggregate, or adjusting the percentages of the aggregates in the blend.

10. In Columns N through Q, enter the names of the aggregates selected in Step 9 for the second gradation trial. Enter the gradations of these aggregates in Column (1) under each of the aggregates. At the top of Column (2) under each of the aggregates listed, enter the percentage determined in Step 9.

11. In Columns N through Q, multiply the percentages listed in Column (1) under each material by the percentage at the top of Column (2). Enter the results in Column (2). Add the percentages listed in Column (2) under each material horizontally and enter the totals in Column R.

12. Compare the percentages in Column R with the specified percentages in Column B or C. If the gradation in Column R is within the specification limits, the proper aggregate blend has been determined. If not, continue repeating Steps 9 through 11 until the proper blend has been determined.

13. To complete Column S, the total percentage of aggregate passing each screen, begin with the smallest screen size for which there is a percentage in Column R. Enter this percentage in Column S. Then add to this percentage the percentage listed for the next smallest screen, and enter the total in Column S. Continue this procedure until the total passing the largest screen (100%) has been entered in Column S.

14. On Work Form plot a cumulative gradation curve for the aggregate blend determined previously. This is done by plotting the percentages in Column S of Work Form and connecting the points to form a curve.

15. The curve constructed in Step 14 is used to divide the aggregate into the required number of separations. It is desirable to have these separations as nearly equal as possible. The number of separations to be used must be determined from the specifications.

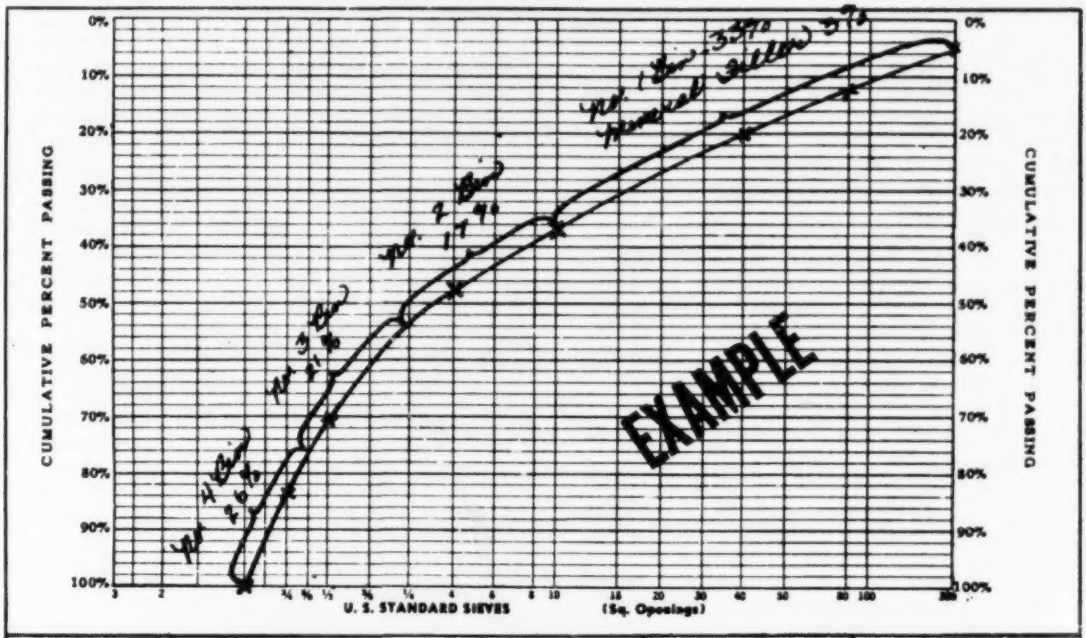
16. In making the separation, begin with the smallest sized material. Since the No. 10 screen is the smallest division that can be made, all material smaller than No. 10 must be put into the No. 1 bin. The remaining material is separated to provide the required number of separations.

17. Select the correct screens from Work Form,

18. Install the screens according to the proper setup illustrated on Page 32

19. Fill the gradation unit bins with hot, dried aggregate and continue with the procedure outlined on Page 6.

TRIAL →			← SECOND GRADATION TRIAL →									
L		M	N		O		P		Q		R	S
		COMBINED TOTAL	Crushed Stone		River Sand		Fine Sand		Mineral Filler		COMBINED TOTAL	CUMULATIVE PERCENT PASSING
(1) %	(2) %	%	(1) %	(2) 60 %	(1) %	(2) 20 %	(1) %	(2) 17 %	(1) %	(2) 3 %	%	%
		16.8	28	16.8							16.8	100.0
		13.8	23	13.8							13.8	83.2
		22.2	37	22.2							22.2	69.4
		13.0	5	3.0	40	8.0					11.0	47.2
		18.1	1	.6	51	10.2	31	5.3			16.1	36.2
		7.2	2	1.2	5	1.0	32	5.4			7.6	20.1
		5.9	1	.6	2	.4	32	5.4	333	1.0	7.4	12.5
		3.0	3	1.8	2	.4	5	.9	66.7	2.0	5.1	5.1
100%		100%	100%	60%	100%	20%	100%	17%	100%	3%	100%	



Check screens required (from Page 33)	☑ Scalping Screen	☑ Top Screen	☑ Intermediate Screen	☑ Bottom Screen
Enter U. S. Std. Seive Size to be produced by each screen	1"	5/8"	1/4"	No. 10
Enter screen cloth selected to deliver sizes listed above	FROM TABLE 'J' 1 1/8"	FROM TABLE 'J' 3/4"	FROM TABLE 'J' 5/16"	FROM TABLE 'J' 1/2"

TABLE J

U. S. Std. Seive Size	Screen Openings	U. S. Std. Seive Size	Screen Openings
No. 10 (.079")	1/12"	5/8"	3/4"
No. 8 (.094")	1/10"	3/4"	7/8"
No. 7 (.111")	1/8"	7/8"	1"
No. 6 (.132")	5/32"	1"	1 1/8"
No. 5 (.157")	3/16"	1 1/8"	1 1/4"
No. 4 (.187")	1/4"	1 1/4"	1 3/8"
1/4"	5/16"	1 3/8"	1 1/2"
5/16"	3/8"	1 1/2"	1 5/8"
3/8"	7/16"	1 5/8"	1 3/4"
7/16"	1/2"	1 3/4"	2"
1/2"	9/16"	2"	2 1/4"
9/16"	5/8"	2 1/4"	2 1/2"

Screen Flow Selector Lever Settings

The single flow selector lever may be set in one of two positions, Figure 14 shows lever in position for 4 bin split, Figure 15 shows lever in position for a 3 bin split. This gives the flexibility of rejecting the 4 bin material for quick change-over from binder mixes to top mixes.

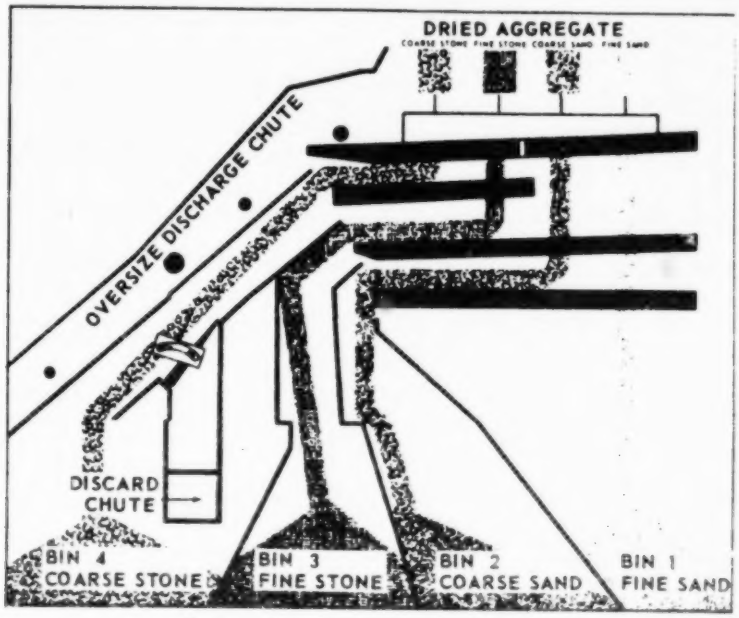


Figure 14 - 4-Aggregate Set-Up

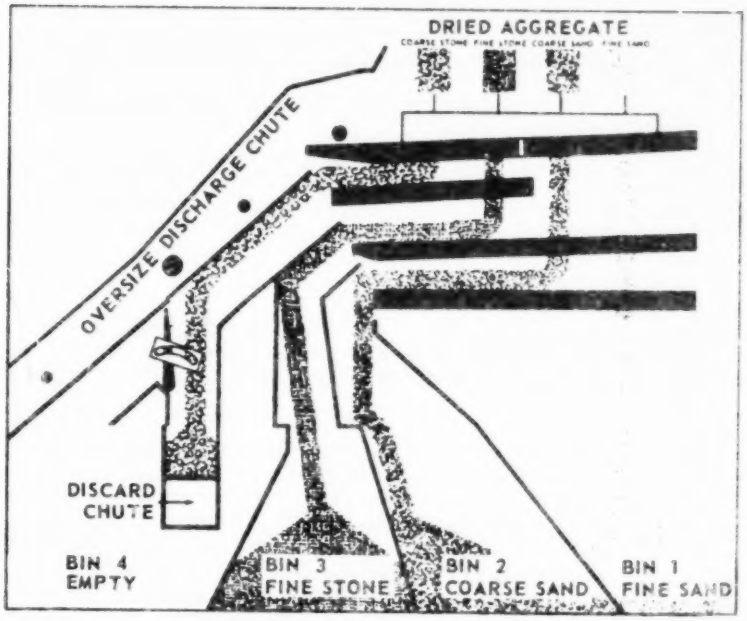


Figure 15 3-Aggregate Set-Up

APPROXIMATE SCREEN CAPACITIES

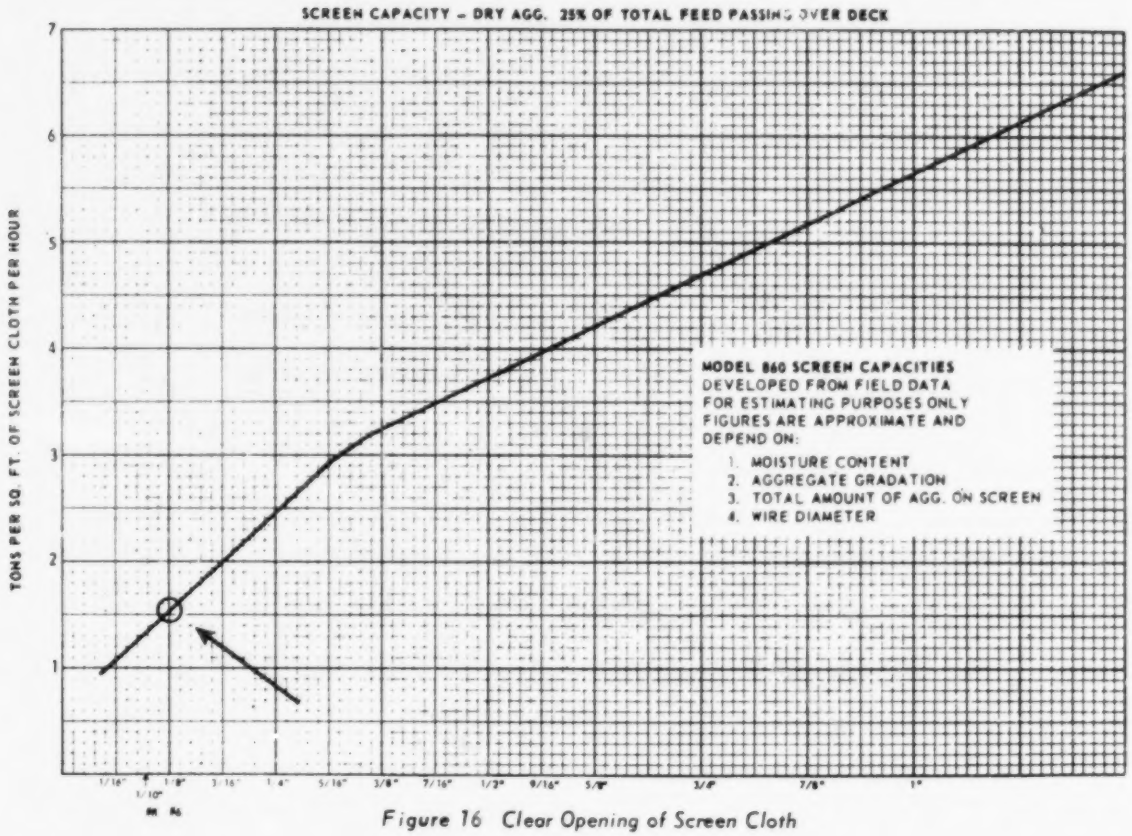


Figure 16 Clear Opening of Screen Cloth

The above chart represents an approximation of the amount of material that a screen, with given size openings, can process. The final figure on the amount of material a screen can process can only be determined after observation of a given operating screen and a given aggregate. This figure depends on moisture content, aggregate gradation, total amount of aggregate on the screen at any one time, and the diameter of the wire in the screen. The figures in this chart are given in T.P.H. per 1 square foot of area of the screen cloth.

This equipment uses 3 full decks plus a short scalping deck with GQ 60. The screen which usually limits the final capacity of a plant is naturally the one with the smallest openings. That is why the estimated capacity of the plant is based on the amount of material the screen cloth with the smallest openings can pass. The above chart can be used in this connection.

EXAMPLE: For example, say that, of the screen cloths we are using, the one with the smallest openings has 1/8" clear space between the wires. From the chart we find that a 1/8" clear opening screen cloth will pass approximately 1-½ T.P.H. per square foot area of the cloth. If we are using a 4' x 14' screen (or 56 Sq. Ft.) we will be able to process about 84 T.P.H. (56 Sq. Ft. x 1-½ T.P.H.=84 T.P.H.). If the mix set-up requires 40 per cent of the total mix be taken from the 1 bin (i.e. the one under the smallest opening screen cloth) then the maximum total capacity of the screen unit will be approximately 210 T.P.H. (84 ÷ 40 per cent). This figure is only an approximation and sometimes materials will be used that screen hardest on a screen other than the smallest one. In these unusual cases, this chart must be disregarded and a final capacity established on actual observation of the screen.

9. Cold Feed Calibrations

Determining Cold Feeder Gate Openings

Establishing settings for cold aggregate feeders must be done after operation starts, due to varying aggregate weights and bulking. The method outlined below, give only approximate settings. After starting operation, if any gradation unit bin runs low or overflows, adjustment must be made in the cold feeder gate supplying aggregate to that bin.

***CAUTION** – Make feeder adjustments in small increments.*

SUGGESTIONS FOR COLD FEEDER GATE OPENINGS

(Remember these suggestions are an aide and not a set of rules for cold feed application.)

1. Determine tons per hour required of each aggregate according to mix specifications.

EXAMPLE	Bin No. 1	Bin No. 2	Bin No. 3	Bin No. 4
Enter pounds required per revolution from each bin	80	40	50	62.5
Multiply by (to convert to tons per hr.)	X 1	X 1	X 1	X 1
Equals tons per hr. required from each bin	80	40	50	62.5

2. Estimate feeder gate openings required to give these tons per hour.

NOTE: The gate settings will require final adjustment after observing the operation of the plant. Final adjustment of the cold feed gates must be made to keep hot bins from "Starving" or "Overflowing".

3. Feeders equipped with remote speed control.

A. Set all dials to 0.

B. Open feeder gates according to percent of aggregate required for mix.

C. Fine tune percentages with each feeder speed control dial.

D. When feeders have total proportional control, to increase or decrease total feeder capacity (without changing relative % of aggregate) use trimer dial.

10. Work Forms for Calibration

Page 36. Deleted as not applicable.

Page 37. Deleted as not applicable.

Page 38. Deleted as not applicable.

Page 39. Deleted as not applicable.

FORM

CHECKING GRADATION UNIT GATE SETTINGS

After the gradation unit gates have been set it is very important to check the amount of aggregate actually fed by each gate.

If a gate is feeding too much or too little aggregate, it can be corrected by slightly increasing or decreasing the gate opening. After the gates have been reset, another check should be made.

NOTE: Gates feeding coarse aggregate should NOT be set lower than 1½ times the largest aggregate size. For example, if a gate is feeding aggregate with 1" maximum particles, the gate must not be set lower than 1½".

RECHECK (MANUAL)

FIRST CHECK TEST OF GRADATION UNIT GATE SETTINGS

CHECK TEST FOR GATES	(Weight of filled bucket)	MINUS	(Weight of empty bucket)	EQUALS	(Weight of aggregate delivered)	DIVIDED BY	(Revolutions run-final counter reading less initial reading)	EQUALS	(Pounds delivered per revolution)	(Pounds required per revolution from Page 12)
___" Gate	Bin #1	—	(1)	=	(1)	÷	Final	=	(1)	(1)
___" Gate	Bin #2	—	(2)	=	(2)		Less Initial		(2)	(2)
___" Gate	Bin #3	—	(3)	=	(3)				(3)	(3)
___" Gate	Bin #4	—	(4)	=	(4)				(4)	(4)

SECOND CHECK TEST OF GRADATION UNIT GATE SETTINGS

CHECK TEST FOR GATES	(Weight of filled bucket)	MINUS	Weight of empty bucket)	EQUALS	(Weight of aggregate delivered)	DIVIDED BY	(Revolutions run-final counter reading less initial reading)	EQUALS	(Pounds delivered per revolution)	(Pounds required per revolution from Page 12)
___" Gate	Bin #1	—	(1)	=	(1)	÷	Final	=	(1)	(1)
___" Gate	Bin #2	—	(2)	=	(2)		Less Initial		(2)	(2)
___" Gate	Bin #3	—	(3)	=	(3)				(3)	(3)
___" Gate	Bin #4	—	(4)	=	(4)				(4)	(4)

FORM

CALIBRATION OF GRADATION UNIT FEEDER GATES (MANUAL)

The gates are calibrated by running tests at various gate openings. During the tests, the flow of aggregate from each bin is diverted into separate test buckets. The weight of the contents of each bucket is divided by the number of revolutions run during the test, recorded by the revolution counter. This gives the number of pounds of aggregate fed per revolution from each gate, at each opening tested. The gate opening required to deliver the desired weight of aggregate from each bin per revolution is entered on permanent record form (Page 52).

Before beginning calibration, start screening unit and fill bins with hot dried aggregate. Test buckets should be numbered to correspond with gate numbers and weighed. Each time gate openings are set, feeders should be run long enough with flop gate in "run" position to bring material struck off at new gate level to point of discharge. Then flop gate must be turned to "test" position.

To run each test, record initial revolution counter reading; run feeders until test buckets are about 3/4 full; record final revolution counter reading; and weigh filled test buckets.

	Average weight of filled bucket After minimum 3 trials	MINUS	(Weight of empty bucket)	EQUALS	(Weight of aggregate delivered)	DIVIDED BY	(Revolutions run-final counter reading less initial reading)	EQUALS	(Pounds delivered per revolution)
TEST #1	Bin #1	—	(1)	=	(1)	÷	Final	=	(1)
__"GATE	Bin #2	—	(2)	=	(2)		Less		(2)
OPENING	Bin #3	—	(3)	=	(3)		Initial _____		(3)
	Bin #4	—	(4)	=	(4)				(4)
TEST #2	Bin #1	—	(1)	=	(1)	÷	Final	=	(1)
__"GATE	Bin #2	—	(2)	=	(2)		Less		(2)
OPENING	Bin #3	—	(3)	=	(3)		Initial _____		(3)
	Bin #4	—	(4)	=	(4)				(4)
TEST #3	Bin #1	—	(1)	=	(1)	÷	Final	=	(1)
__"GATE	Bin #2	—	(2)	=	(2)		Less		(2)
OPENING	Bin #3	—	(3)	=	(3)		Initial _____		(3)
	Bin #4	—	(4)	=	(4)				(4)
TEST #4	Bin #1	—	(1)	=	(1)	÷	Final	=	(1)
__"GATE	Bin #2	—	(2)	=	(2)		Less		(2)
OPENING	Bin #3	—	(3)	=	(3)		Initial _____		(3)
	Bin #4	—	(4)	=	(4)				(4)

*NOTE - With some types of aggregates, when calibrating the 8" gate opening at the maximum feeder speed, it may be necessary to run two tests and combine the weights to obtain a full revolution of the aggregate feeders.

Page 42. Deleted as not applicable.

FORM

CHECKING METER PUMP OUTPUT (MANUAL)

Move the test scale into position and mount one test bucket on the scale. Weigh and record the test bucket weight.

Put sample pipe into the other bucket and run the mixer until asphalt starts to discharge. Stop the mixer and allow the pipe to drip one minute.

Place the sample pipe into the scale mounted test bucket and record the reading on the revolution counter.

Run the mixer until the asphalt level in the test bucket is near the top. Stop the mixer.

Allow the sample pipe to drip for one minute. Weigh the sample and subtract the weight of the sample bucket to obtain the weight of the asphalt.

Record the revolution counter reading and subtract the reading at the beginning of the test to obtain the number of revolutions used in the test.

Divide the weight of the asphalt by the number of revolutions to obtain the pounds per revolution. Adjust the metering pump if necessary and take another test to check results.

	First Test	Second Test	Third Test	Fourth Test*
DIAL SETTINGS	20	40	60	80
Weight of filled test bucket				
Less weight of empty bucket	—	—	—	—
Equals pounds of bitumen delivered				
Revolution counter reading at end of test				
Less initial revolution counter reading	—	—	—	—
Equals revolutions run				
Pounds of bitumen delivered during test				
Divided by revolutions run	÷	÷	÷	÷
Equals pounds of bitumen per revolution				

	First Test	Second Test	Third Test	Fourth Test
DIAL SETTINGS	20	40	60	80
Weight of filled test bucket				
Less weight of empty bucket	—	—	—	—
Equals pounds of bitumen delivered				
Revolution counter reading at end of test				
Less initial revolution counter reading	—	—	—	—
Equals revolutions run				
Pounds of bitumen delivered during test				
Divided by revolutions run	÷	÷	÷	÷
Equals pounds of bitumen per revolution				

NOTE: If the same answer is obtained from the first two tests, the third test is not necessary. If third test is necessary use average of all three.

FORM

CALIBRATION OF FINES FEEDER

(If fines feeder is not to be used, disregard this page)

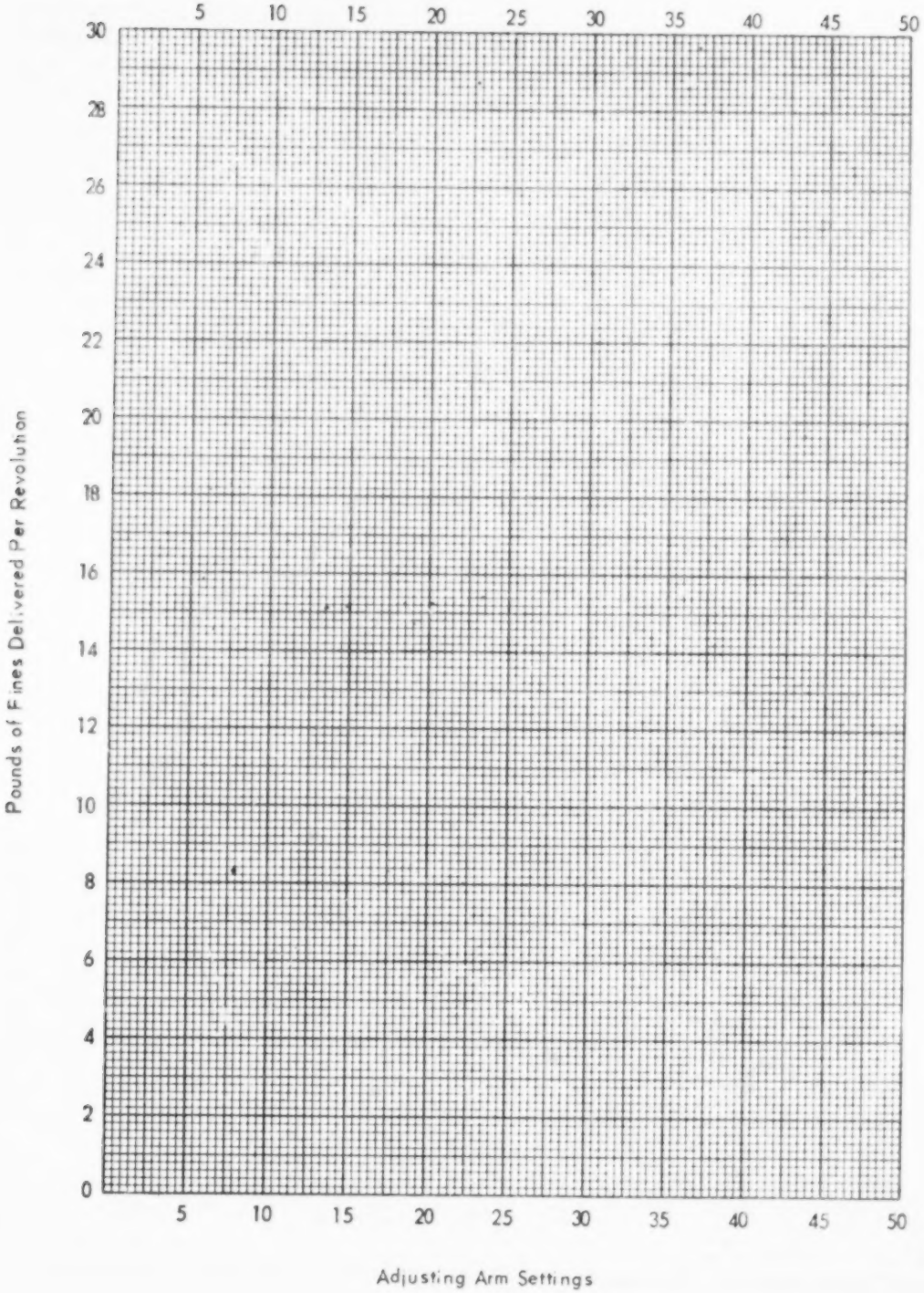
The principle used in calibrating the fines feeder is exactly the same as that used for calibrating the gradation unit feeder gates.

Be sure that gradation unit feeders are disengaged and that fines feeder hopper is filled with at least 300 pounds of fines. Hinged door is opened so that it lies back against housing. Short screw must be filled with material before calibration is begun.	ADJUSTING ARM SETTINGS (Use setting of 50 for first trial, then 30 and 10.)		
	50	30	10
Enter initial revolution counter reading and run feeder until test bucket is half full. Weigh the bucket and fines delivered during test and enter weight at right			
Less weight of empty bucket	—	—	—
Equals weight of fines delivered			
Revolution counter reading at end of trial			
Less initial revolution counter reading	—	—	—
Equals revolutions run			
Weight of fines delivered			
Divided by revolutions run	÷	÷	÷
Equals pounds delivered per revolution			

Plot pounds of fines delivered per revolution at the different adjusting arm settings on Fines Feeder Gate Calibration Graph (next page) and connect points with a straight line.

FORM

FINES FEEDER GATE CALIBRATION GRAPH



FORM

CALIBRATION OF SINGLE AGGREGATE FEEDER GATE

		(Weight of filled buckets)	MINUS	(Weight of empty buckets)	EQUALS	(Weight of aggregate delivered)	DIVIDED BY	(Revolutions run-final counter reading less initial reading)	EQUALS	(Pounds delivered per revolution)
TEST #1	FOR GROUND MOUNTED HOPPER AND FEEDER						÷	Final Less Initial_____	=	
2" GATE OPENING	FOR MIXED MOUNTED HOPPER AND FEEDER	(Weight of filled truck)	MINUS	(Weight of empty trucks)	EQUALS	(Weight of aggregate delivered)	DIVIDED BY	(Revolutions run-final counter reading less initial reading)	EQUALS	(Pounds delivered per revolution)
							÷	Final Less Initial_____	=	
TEST #2							÷	Final Less Initial_____	=	
4" GATE OPENING							÷	Final Less Initial_____	=	
TEST #3							÷	Final Less Initial_____	=	
6" GATE OPENING							÷	Final Less Initial_____	=	
TEST #4							÷	Final Less Initial_____	=	
8" GATE OPENING							÷	Final Less Initial_____	=	

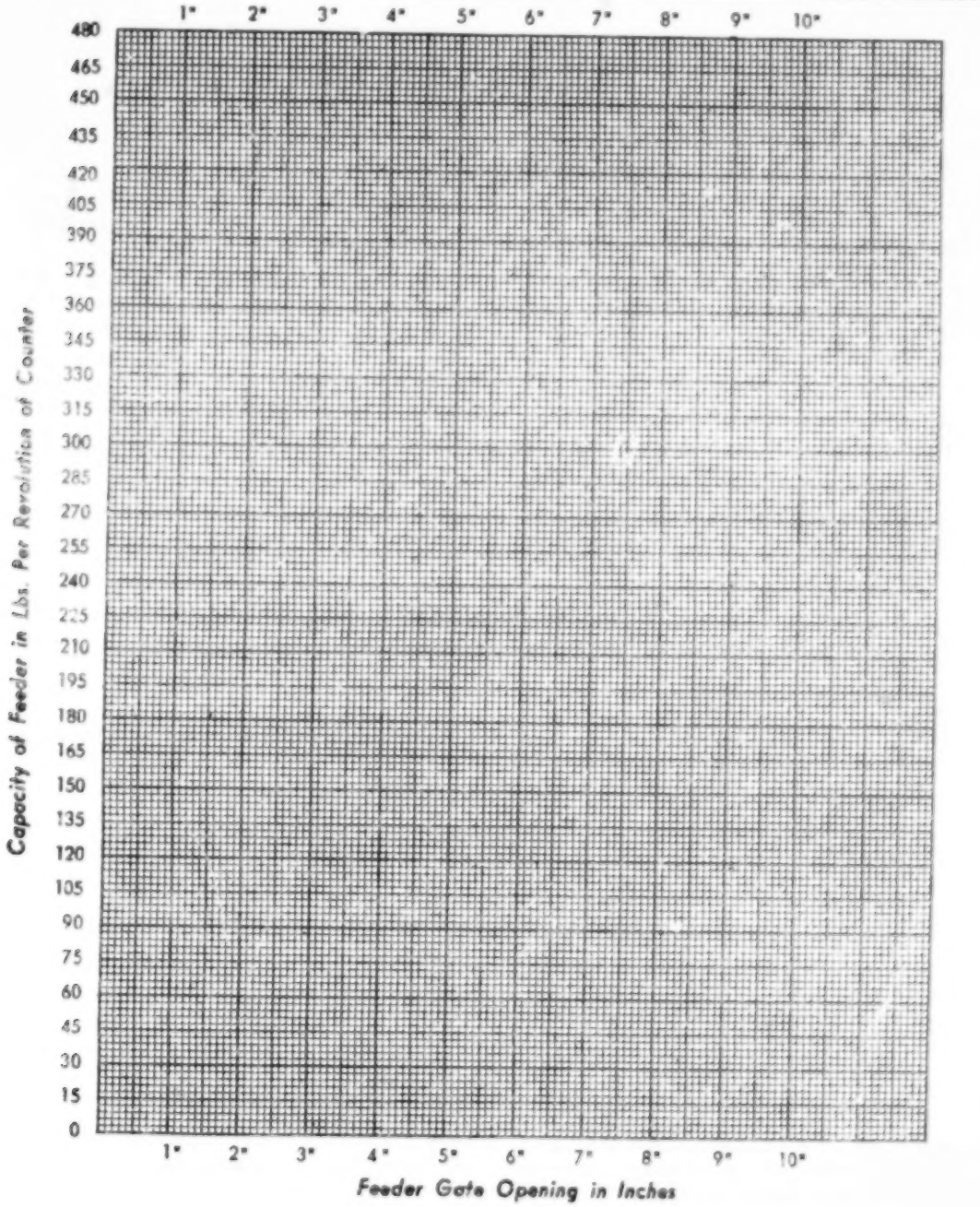
Plot pounds of aggregate delivered per revolution at the different gate openings on Feeder Gate Calibration Graph (next page), and connect points to form a curve.

FORM

FEEDER GATE CALIBRATION CHART
FOR SINGLE AGGREGATE PLANTS

Machine Model_____ Revolution Counter_____ RPM

Job_____



FORM

DETERMINING THE PROPER AGGREGATE BLEND AND SELECTING THE CORRECT SCREENS

The first step in starting any bituminous plant—continuous or batch—is to determine the proper aggregate blend and select the correct screens. This work is normally done by an engineer, but if it must be done by plant personnel, the following simplified procedure may be used.

1. Enter mix specifications in Columns A and B of Form below. Permissible percentages of each size are stated in the specifications either as minimum–maximum limits (10% to 30%) or as a definite percentage (13.6%).

2. If the percentages entered in Column B are based on total mix (that is, if the percentage of bitumen must be added to equal 100%), it is necessary to convert these percentages to 100% aggregate. This is done by dividing the percentages in Column B by the total percentage of aggregate (100% minus the percentage of bitumen). The corrected percentages are entered in Column C.

3. List the available aggregates in Columns D through H, and enter the gradation of each, based on actual test results.

4. Select the aggregates which appear most likely to produce the desired gradation by comparing their gradations with the specified gradation in Column B or C. Enter the names of these aggregates at the top of Columns I through L under "First Gradation Trial." Enter the gradations of these aggregates in Column (1) under each of the aggregates. (This information may be taken from Columns D through H.)

5. By comparing the gradations of the aggregates listed under "First Gradation Trial" with the specified percentages of each size, determine the percentage of each aggregate which appears likely to give the specified gradation. Enter these percentages at the top of Column (2) under each of the aggregates listed.

6. In Columns I through L, multiply the percentages listed in Column (1) under each material by the percentage at the top of Column (2). Enter the results in Column (2).

7. Add the percentages listed in Column (2) under each material horizontally and enter the totals in Column M.

8. Compare the percentages in Column M with the specified percentages in Column B or C. If the gradation in Column M is within the specification limits, the proper aggregate blend has been determined. Skip Steps 9, 10, 11, and 12, and go immediately to Step 13. Otherwise, continue with Step 9.

9. Compare the percentages in Column M with the

				GRADATION OF AVAILABLE AGGREGATES →					FIRST GRADATION →					
A		B	C	D	E	F	G	H	I		J		K	
SCREEN SIZES		AGGREGATE SPECS.	SPECS CONVERTED TO 100% AGGREGATE											
PASS	RET.	%	%	%	%	%	%	%	(1) %	(2) %	(1) %	(2) %	(1) %	(2) /5 %
TOTALS			100%	100%	100%	100%	100%	100%	100%		100%		100%	

specified percentages in Column B or C, and determine what changes are required to produce an aggregate blend that will meet the specifications. These changes may include adding a different aggregate, substituting one aggregate for another, eliminating an aggregate, or adjusting the percentages of the aggregates in the blend.

10. In Columns N through Q, enter the names of the aggregates selected in Step 9 for the second gradation trial. Enter the gradations of these aggregates in Column (1) under each of the aggregates. At the top of Column (2) under each of the aggregates listed, enter the percentage determined in Step 9.

11. In Columns N through Q, multiply the percentages listed in Column (1) under each material by the percentage at the top of Column (2). Enter the results in Column (2). Add the percentages listed in Column (2) under each material horizontally and enter the totals in Column R.

12. Compare the percentages in Column R with the specified percentages in Column B or C. If the gradation in Column R is within the specification limits, the proper aggregate blend has been determined. If not, continue repeating Steps 9 through 11 until the proper blend has been determined.

13. To complete Column S, the total percentage of aggregate passing each screen, begin with the smallest screen size for which there is a percentage in Column R. Enter this percentage in Column S. Then add to this percentage the percentage listed for the next smallest screen, and enter the total in Column S. Continue this procedure until the total passing the largest screen (100%) has been entered in Column S.

14. On Work Form plot a cumulative gradation curve for the aggregate blend determined previously. This is done by plotting the percentages in Column S of Work Form and connecting the points to form a curve.

15. The curve constructed in Step 14 is used to divide the aggregate into the required number of separations. It is desirable to have these separations as nearly equal as possible. The number of separations to be used must be determined from the specifications.

16. In making the separation, begin with the smallest sized material. Since the No. 10 screen is the smallest division that can be made, all material smaller than No. 10 must be put into the No. 1 bin. The remaining material is separated to provide the required number of separations.

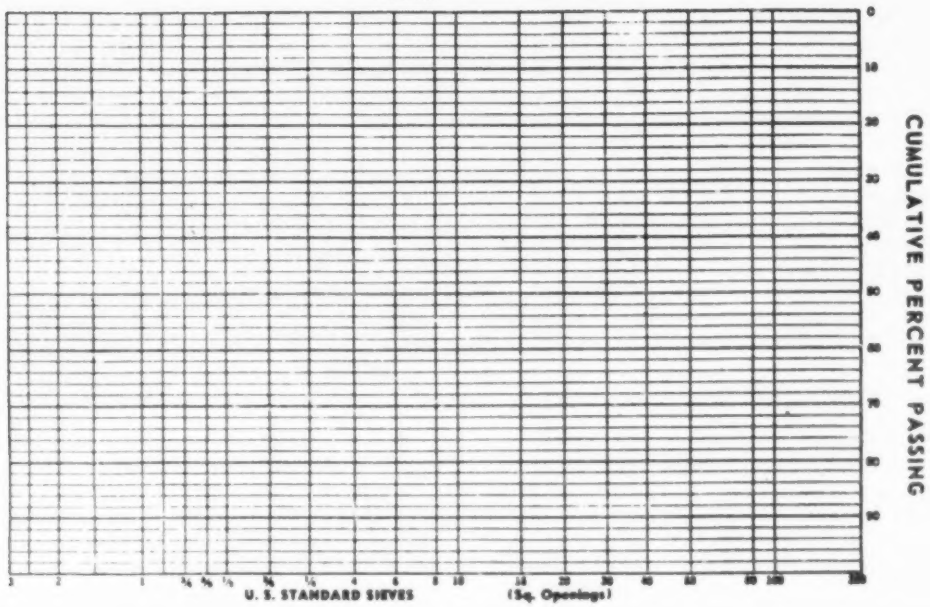
17. Select the correct screens from Work Form.

18. Install the screens according to the proper setup illustrated on Page 32.

19. Fill the gradation unit bins with hot, dried aggregate and continue with the procedure outlined on Page 6.

TRIAL →				← SECOND GRADATION TRIAL →											
L		M		N		O		P		Q		R	S		
		COMBINED TOTAL										COMBINED TOTAL	CUMULATIVE PERCENT PASSING		
(1) %	(2) %	%		(1) %	(2) %	(1) %	(2) %	(1) %	(2) %	(1) %	(2) %	%	%		
100%		100%		100%		100%		100%		100%		100%			

FORM



Check screens required (from Page 30)	☐ Scalping Screen	☐ Top Screen	☐ Intermediate Screen	☐ Bottom Screen
Enter U. S. Std. Seive Size to be produced by each screen				
Enter screen cloth selected to deliver sizes listed above	FROM TABLE "J"	FROM TABLE "J"	FROM TABLE "J"	FROM TABLE "J"

TABLE J

U. S. Std. Seive Size	Screen Openings
No. 10 (.079")	1/12"
No. 8 (.094")	1/10"
No. 7 (.111")	1/9"
No. 6 (.132")	5/32"
No. 5 (.157")	3/16"
No. 4 (.187")	1/4"
1/4"	5/16"
5/16"	3/8"
3/8"	7/16"
7/16"	1/2"
1/2"	9/16"
9/16"	5/8"

U. S. Std. Seive Size	Screen Openings
5/8"	3/4"
3/4"	7/8"
7/8"	1"
1"	1 1/8"
1 1/8"	1 1/4"
1 1/4"	1 3/8"
1 3/8"	1 1/2"
1 1/2"	1 5/8"
1 5/8"	1 3/4"
1 3/4"	2"
2"	2 1/4"
2 1/4"	2 1/2"

Page 51. Deleted as not applicable.

PERMANENT SPRING SCALE AND GATE SETTING RECORD FORM

Mix #1

Bin #1 Gate Settings	INCHES	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"
	POUNDS										
Bin #2 Gate Settings	INCHES										
	POUNDS										
Bin #3 Gate Settings	INCHES										
	POUNDS										
Bin #4 Gate Settings	INCHES										
	POUNDS										

Mix #2

Bin #1 Gate Settings											
Bin #2 Gate Settings											

Mix #3

APPENDIX A

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. Scope

This appendix lists items which accompany the feeder or are required for calibration and operation.

2. General

This Basic Issue Items List is a listing of accessories and publications required for operation, initially issued with, or authorized for the feeder.

3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II:

a. Source, Maintenance, and Recoverability Codes (SMR), Column 1:

(1) Source Code indicates the selection status and source for the listed item. Source code is "P"; applied to items which are stocked in or supplied from GSA/DSA Army supply system, and authorized for use at indicated maintenance level.

(2) Maintenance Code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is "C"; Operator/crew.

b. Federal Stock Number, Column 2. This column indicates the Federal Stock Number for the item.

c. Description, Column 3. This column indicates the Federal item name and any additional description required.

d. Unit of Issue, Column 4. This column indicates the unit used as a basis of issue, e.g., ea, pr, ft, yd, etc.

e. Quantity Incorporated in Unit Pack, Column 5. This column not applicable.

f. Quantity Incorporated in Unit, Column 6. This column not applicable.

g. Quantity Furnished With Equipment, Column 7. This column indicates the quantity of an item furnished with the equipment in excess of the quantity incorporated in the unit.

h. Quantity Authorized, Column 8. This column indicates the quantity of an item authorized the operator/crew to have on hand or to obtain as required. As required items are indicated with an asterisk.

i. Illustration, Column 9. This column not applicable.

SECTION II. BASIC ISSUE ITEMS

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION Ref No & Mfr Code / Useable on Code	(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY FURN WITH EQUIP	(8) QTY AUTH	(9) ILLUSTRATION (a) FIG NO.	(9) ILLUSTRATION (b) ITEM NO.
		3100 MANUFACTURER OR DEPOT INSTALLED							
P-C	7510-889-3494	BINDER, Loose leaf	EA			1	1		
P-C	7520-559-9618	CASE, Operation and Maintenance Manuals	EA			1	1		
P-C	7510-244-0359	CONTAINER, PLASTIC Log book binder	EA			1	1		
P-C		DA TECHNICAL MANUAL TM 5-3895-289-10	EA			1	1		

By Order of the Secretary of the Army:

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Chief of Staff.

Official:

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The Adjutant General.

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